General Relativity and Gravitation

VOLUME 3

1972

Published by

PLENUM PUBLISHING CO. LTD
Davis House, 8 Scrubs Lane, Harlesden, London NW10 6SE

CONTENT OF ISSUES

VOLUME 3 NUMBER 1: 1972

RESEARCH ARTICLES

Horizons in Weyl Metrics Exhibiting Extra Symmetries
BRENDAN B. GODFREY 3
Electrodynamics in an Expanding Universe
G.E. TAUBER 17
External Field of a Localized Charge in Unified Field Theory
D.N. PANT 29
Characteristic Function of Robertson-Walker Spaces
H.A. BUCHDAHL 35
Note on Asymptotically Flat Empty Spaces
T.W.J. UNTI 43

REVIEW ARTICLES

Advances in Gravitational Radiation Detection
J. WEBER 59
Gravitational Collapse and Related Phenomena from an Empirical Point of View
P.J.E. PEEBLES 63

ANNOUNCEMENT 83

VOLUME 3 NUMBER 2: 1972

RESEARCH ARTICLES

Perfect Fluid Distribution in Class One Space-Time
G.P. POKHARIYAL 87
Solution of the Einstein-Maxwell Equations for a Static Distribution of Massive Charged Particles
K. NORDTVEDT, Jr. 95
Mach's Principle in General Relativity
J.H. HIGBIE 101

LETTERS TO THE EDITOR

An Improved Detector of Gravitational Radiation
P.S. APLIN 111
Lorentzian Symmetric Spaces
M. CAHEN 115
Gravitational Collapse, White Holes and Particle Creation
YA.B. ZEL'DOVICH AND I.D. NOVIKOV 119
The Weak-Field Approximation and the Range of Gravitational Force
D. LAYZER AND J.R. BURKE 121

REVIEW ARTICLES

Present Status of the Theory of the Relativity-Gyroscope Experiment
R.F. O'CONNELL 123

CONTENTS OF ISSUES

Testing General Relativity: Progress, Problems and Prospects
I.I. SHAPIRO 135
Recent Developments in the Theory of Gravitational Radiation
D.W. SCIAMA 149
Summary of the GR6 Conference
A. TRAUTMAN 167

REPORTS

Report on the "Journées Relativistes" d'Aix-en-Provence, 1-3 April, 1971
M. CAMENZIND 175
Report of the Conference on "Cosmology, Gravitation and Applications to Particle Theory"
A.R. PRASANNA 183

ERRATUM 187

BULLETIN GRG, NO. 28 189

VOLUME 3 NUMBER 3: 1972

RESEARCH ARTICLES

On the Mass of the Graviton
H. VAN DAM AND M. VELTMAN 215
Rotational Energy, Pulsars, and Active Nebulae
JEFFREY M. COHEN 221
Slow Motion Approximations in General Relativity I. Decomposition of the Field Equations
W.G. DIXON 227
Some Problems in Nuclear and Elementary Particle Physics Involving Gravitons
M.G. HARE AND G. PAPINI 251
External Sources in General Relativity
JOHN STACHEL 257
Model of a Gravitating Sphere set in Rotation by Internal Stress
P.A. HOGAN AND J.L. SYNGE 269

REVIEW ARTICLE

A New Spinor Calculus
PETER RASTALL 281

VOLUME 3 NUMBER 4: 1972

RESEARCH ARTICLES

Two Examples of non-Radiative Systems - An Application of Homogeneous Functions to Synge's Approximation Method
EDGAR PECHLANER 305
SL(2,C) Invariance of the Gravitational Field
MOSHE CARMELI 317

CONTENTS OF ISSUES

The Possibility of Negative Gravitational Energy
DAVID C. ROBINSON AND JEFFREY WINICOUR 325
Gravitational Collapse with Charge and Small Asymmetries I. Scalar Perturbations
JIŘÍ BIČÁK 331
A Modified Equation of Geodesic Deviation
D.E. HODGKINSON 351
On the Models of Gravitational Fields
A.Z. PETROV 377
Transverse Shift by Total Reflection of a Circularly Polarised Light Beam: Theory and Experimental Proof
O. COSTA DE BEAUREGARD 391

LETTERS TO THE EDITOR

Curvature Collineations
P.C. AICHELBURG 397
Gravitational Electromagnetic Resonance
V.B. BRAGINSKY AND M.B. MENSKY 401
The Equivalence of Inertial and Passive Gravitational Mass
V.B. BRAGINSKY AND V.I. PANOV 403
Virtual Particles as Sources of the Gravitational Field
LEOPOLD HALPERN 405

BOOK REVIEW 409

INDEX TO AUTHORS

AICHELBURG, P.C. *Curvature Collineations* 397
APLIN, P.S. *An Improved Detector of Gravitational Radiation*... 111
BIČÁK, Jiří. *Gravitational Collapse with Charge and Small Asymmetries. I. Scalar Perturbations* 331
BRAGINSKY, V.B. *Gravitational Electromagnetic Resonance* ... 401
BRAGINSKY, V.B. *The Equivalence of Inertial and Passive Gravitational Mass* 403
BUCHDAHL, H.A. *Characteristic Function of Robertson-Walker Spaces* 35
BURKE, J.R. *The Weak-Field Approximation and the Range of Gravitational Force* 121
CAHEN, M. *Lorentzian Symmetric Spaces* 115
CAMENZIND, M. *Report on the "Journées Relativistes' d'Aix-en-Provence, 1-3 April, 1971.* 175
CARMELI, Moshe. *SL(2,C) Invariance of the Gravitational Field* 317
COHEN, Jeffrey M. *Rotational Energy, Pulsars, and Active Nebulae* 221
COSTA DE BEAUREGARD, O. *Transverse Shift by Total Reflection of a Circularly Polarised Light Beam: Theory and Experimental Proof* 391
DIXON, W.G. *Slow-Motion Approximations in General Relativity I. Decomposition of the Field Equations* 227
GODFREY, Brendan B. *Horizons in Weyl Metrics Exhibiting Extra Symmetries* 3
HALPERN, Leopold. *Virtual Particles as Sources of the Gravitational Field* 405
HARE, M.G. *Some Problems in Nuclear and Elementary Particle Physics Involving Gravitons* 251
HIGBIE, J.H. *Mach's Principle in General Relativity* 101
HODGKINSON, D.E. *A Modified Equation of Geodesic Deviation* ... 351
HOGAN, P.A. *Model of a Gravitating Sphere set in Rotation by Internal Stress* 269
LAYZER, D. *The Weak-Field Approximation and the Range of Gravitational Force* 121
MENSKY, M.B. *Gravitational Electromagnetic Resonance* 401
MIKETINAC, M.J. *Singularities in General Relativity* 187
NORDTVEDT, K., Jr. *Solution of the Einstein-Maxwell Equations for a Static Distribution of Massive Charged Particles* 95
NOVIKOV, I.D. *Gravitational Collapse, White Holes and Particle Creation* 119
O'CONNELL, R.F. *Present Status of the Theory of the Relativity-Gyroscope Experiment* 123
PACHNER, J. *Singularities in General Relativity*... 187
PANOV, V.I. *The Equivalence of Inertial and Passive Gravitational Mass* 403
PANT, D.N. *External Field of a Localised Charge in Unified Field Theory* 29
PAPINI, G. *Some Problems in Nuclear and Elementary Particle Physics Involving Gravitons* 251

INDEX TO AUTHORS

PECHLANER, Edgar. *Two Examples of Non-Radiative Systems - An Application of Homogeneous Functions to Synge's Approximation Method* 305
PEEBLES, P.J.E. *Gravitational Collapse and Related Phenomena from an Empirical Point of View* 63
PETROV, A.Z. *On the Models of Gravitational Fields* 377
POKHARIYAL, G.P. *Perfect Fluid Distribution in Class One Space-Time* 87
PRASANNA, A.R. *Report of the Conference on "Cosmology, Gravitation and Applications to Particle Theory"* 183
RASTALL, Peter. *A New Spinor Calculus* 281
ROBINSON, David C. *The Possibility of Negative Gravitational Energy* 325
SCIAMA, D.W. *Recent Developments in the Theory of Gravitational Radiation* 149
SHAPIRO, I.I. *Testing General Relativity: Progress, Problems and Prospects* 135
STACHEL, John. *External Sources in General Relativity* ... 257
SYNGE, J.L. *Model of a Gravitating Sphere set in Rotation by Internal Stress* 269
TAUBER, G.E. *Electrodynamics in an Expanding Universe* ... 17
TRAUTMAN, A. *Summary of the GR6 Conference* 167
UNTI, T.W.J. *Note on Asymptotically Flat Empty Spaces* ... 43
van DAM, H. *On the Mass of the Graviton* 215
VELTMAN, M. *On the Mass of the Graviton* 215
WEBER, J. *Advances in Gravitational Radiation Detection* ... 59
WINICOUR, Jeffrey. *The Possibility of Negative Gravitational Energy* 325
ZEL'DOVICH, Ya. B. *Gravitational Collapse, White Holes and Particle Creation...* 119